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1850 M Street, NW, Suite 1100
Washington, DC 20036
Telephone (202) 828-7452
Fax (202) 857-8900

Warren D. Hannah
Director - Federal Regulatory Relations
Local Telecommunications Division

EX PARTE

May 16, 1996

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W. Room 222
Washington, D.C. 20554

RE: In the Matter of Price Cap Performance Review for Local Exchange Carriers
CC Docket No. 94-1

Dear Mr. Caton,

The enclosed material is provided as a follow up to an April 1, 1996, ex parte meeting with Messrs. Les Selzer and Anthony Bush of the Common Carrier Bureau's Competitive Pricing Division. The enclosed material documents back-up data and contains detailed methodologies employed by Dr. Frank Cronin of A.T. Kearney, Inc. in performing studies for Sprint in the above referenced docket. Studies performed by Dr. Cronin were previously submitted with Sprint's Reply Comments in the Commission's Fourth Further Notice of Proposed Rulemaking in CC Docket 94-1.

Representing Sprint during the April 1 meeting were Messrs. Jay Keithley, Jim Sichter, Pete Sywenki and Dr. Frank Cronin of A.T. Kearney, Inc. Sprint requests that this information be made a part of the record in this matter. Two copies of this letter, in accordance with Section 1.1206(a)(1), is provided for this purpose. If you have any questions, please feel free to call.

Sincerely,

Warren D. Hannah

c: Mr. Les Seltzer, FCC, Washington, D.C. (w/enclosures)
Mr. Anthony Bush, FCC, Washington, D.C.
Mr. Jay Keithley, Sprint, Washington, D.C.
Mr. Jim Sichter, Sprint, Westwood, KS
Mr. Pete Sywenki, Sprint, Westwood, KS

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Employing Publicly Available Data to Construct Price Cap Price Indices

Prepared for Sprint Corporation

By

Francis J. Cronin Ph.D.

Marion Robbins

A.T. Kearney, Inc.

April, 1996

Table of Contents

1.0 Introduction

In 1990, the Federal Communications Commission (the FCC) replaced rate-of-return regulation for the Bell Operating Companies and GTE Operating Companies with price cap regulation, effective January 1, 1991.[1] This action followed the FCC's 1989 decision to eliminate traditional rate-of-return regulation for AT&T and replace it with a price cap regime.[2] In the *LEC Price Cap Order,* the FCC scheduled a performance review. The first phase of this review was completed in March 1995.[3] This performance review represents an endorsement of the concept of incentive regulation and of a price cap methodology, while recognizing that changes to the price cap framework implemented between 1988 and 1990 may be required.

As a result, in the *First Report and Order,* the FCC rightly revised several aspects of the LEC price cap plan on an interim basis. Concurrently, the FCC stated that it expected to make additional long-term changes to the price cap plan after further proceedings. In its *Fourth Further Notice of Proposed Rulemaking*, the FCC sought "comment on a number of issues regarding methods for establishing the price caps."[4] Specifically, the FCC has recognized that certain biases may exist in the current price cap framework. While the current focus of the regulatory proceedings may be on improving the accuracy of the X-Factor through improved productivity measures, other embedded biases must be identified that could continue to overstate permitted LEC price increases.

2.0 Background

In response to the issues raised by the FCC in the Fourth Further Notice, Cronin et al.[5] theoretically and empirically examined the biases embedded in the current LEC price cap formula. The authors focused on the role of price change measurements within a price cap regime and the implications the selection of alternative formula specifications and price indices can have on the overall accuracy of the price cap measure.

In general, our quantitative analysis revealed that the biases that exist in the current LEC price cap formula and in the proposed USTA price cap form are significant and

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[1] Policy and Rules Concerning Rates for Dominant Carriers, CC Docket No. 87-313, 5 FCC Rcd 6786 (1990) *(LEC Price Cap Order).*

[2] Policy and Rules Concerning Rates for Dominant Carriers, CC Docket No. 87-313, Notice of Proposed Rulemaking, 2 FCC Rcd 5208 (1987), Further Notice of Proposed Rulemaking, 3 FCC Rcd 3195 (1988) *(Further Notice),* Report and Order and Second Further Notice, 4 FCC Rcd 2873 (1989) *(AT&T Price Cap Order).*

[3] *First Report and Order,* p. 7.

[4] Other issues raised in the proceedings for further inquiry include, sharing the common line formula, and exogenous costs. See: *Fourth Further Notice,* pp. 3-4.

[5] "Examining the Appropriate Role of Prices in Price Cap Regulation," prepared for Sprint Corporation by A.T. Kearney, February 1996

measurable. Our analysis compared the *modified differential approach* with two alternative, more appropriately specified price cap formulas -- the *full differential approach* and the *direct approach.* Our comparison of price cap formulas was developed applying consistent and clear definitions of publicly available data sets. In comparing the full differential approach with the modified differential approach over the 1985-1993 period, we found an aggregate price index which consistently overstated economy-wide product price inflation by over .8 percent per year and aggregate input prices which exceeded telecommunications input prices by about .9 percent per year. Thus, the modified differential approach formula would overstate required LEC output price changes by 1.79 percent per year. Comparing the modified differential approach with the direct approach, we found that the aggregate price index (the GDP-PI) overstates telecommunications input price changes by about 1.5 percent per year and that the X-Factor is smaller since it nets out aggregate productivity. In other words, a smaller TFP offset is deducted from a larger price increase resulting in an error of 1.79 percent per year in permitted LEC output prices, assuming an aggregate TFP of .29, as estimated by the BLS, over the 1985 to 1993 period.

3.0 Objective

The FCC has explicitly recognized the need to consider and review publicly available data that may prove useful in improving the operational validity of the current LEC price cap plan. This report expands and elaborates on the information presented in Cronin, et al.[6] For each of the key concepts employed in that report to construct price indices for material, labor and capital input, we discuss its 1) source, 2) release date, 3) coverage lag, 4) definition, 5) calculations, and 6) use in the construction of the price indices. Following this information, we present example calculations with data inputs and selections from the raw data and following transformations.

Section II covers the data on sectoral output. Material inputs and prices are discussed in Section III. Section IV discusses labor inputs and prices. Capital inputs and prices are reviewed in Section V.

[6] See, specifically, Appendix B.

Section Ia

Concept:	Sectoral Output
Variable:	Output by industry in current dollars
Source:	Bureau of Labor Statistics, Office of Employment Projections output time series data, November 1995.
Release Date:	Every two years (October or November of odd years). Preliminary 1995 numbers will be out in December of 1996 or January of 1997. Finalized 1995 numbers will be out October or November of 1997.
Lag:	2 to 3 years.
Method:	The output measures follow the definitions and conventions used by the Bureau of Economic Analysis in its input-output tables, published every five years. The industry output measures are based on producer's value and include both primary and secondary products and services.
Calculations:	Direct from Bureau of Labor Statistics Office of Employment Projections
Used to create:	Sectoral price indexes Sectoral inter-industry flows which are summed to calculate industry's material purchases

Data follows on next pages:

63 sector IO naming scheme

63 Sectors	Name (SIC Codes)
1	Farms (01,02)
2	Agricultural Services, Forestry, And Fisheries (07,08,09)
3	Metal Mining (10)
4	Coal Mining (11,12)
5	Oil And Gas Extraction (13)
6	Nonmetallic Minerals, Except Fuels (14)
7	Construction (15,16,17)
8	Lumber And Wood Products (24)
9	Furniture And Fixtures (25)
10	Stone, Clay, And Glass Products (32)
11	Primary Metal Industries (33)
12	Fabricated Metals Products (34)
13	Industrial Machinery And Equipment (35)
14	Electronic And Other Electric Equipment (36)
15	Motor Vehicles And Equipment (371)
16	Transportation Equipment, Except Motor Vehicles (37 Except 371)
17	Instruments And Related Products (38)
18	Miscellaneous Manufacturing Industries (39)
19	Food And Kindred Products (20)
20	Tobacco Manufactures (21)
21	Textile Mill Products (22)
22	Apparel And Other Textile Products (23)
23	Paper And Allied Products (26)
24	Printing And Publishing (27)
25	Chemicals And Allied Products (28)
26	Petroleum And Coal Products (29)
27	Rubber And Miscellaneous Plastics Products (30)
28	Leather And Leather Products (31)
29	Railroad Transportation (40)
30	Local And Interurban Passenger Transit (41)
31	Trucking And Warehousing (42)
32	Water Transporatation (44)
33	Transportation By Air (45)
34	Pipelines, Except Natural Gas (46)
35	Transportation Services (47)
36	Telephone And Telegraph (481,482,489)
37	Radio And Television (483,484)
38	Electric Services (491, Part Of 493)
39	Gas Services (492, Part Of 493)
40	Sanitary Services (494,495,496,497)
41	Wholesale Trade (50,51)
42	Retail Trade (52 Through 59)
43	Depository Institutions (60)
44	Nondepository Institutions incl. Holding And Other Investment Offices (61&67)
45	Security And Commodity Brokers (62)
46	Insurance Carriers (63)
47	Insurance Agents, Brokers, And Service (64)
48	Real Estate (65,66)
49	Hotels And Other Lodging Places (70)

50	Personal Services (72)
51	Business Services (73)
52	Auto Repair, Services, And Parking (75)
53	Miscellaneous Repair Services (76)
54	Motion Pictures (78)
55	Amusement And Recreation Services (79)
56	Health Services (80)
57	Legal Services (81)
58	Educational Services (82)
59	Social Services; Museums, Etc; Membership Organizations;
60	Private Households
61	Federal Government
62	State & Local Government
63	Scrap

Current dollar output by industry reported by the OEP BLS *
Millions of dollars

Industry	1987	1988
1	178859	190099
2	28703	31985
3	7001	9577
4	25929	25655
5	97529	90641
6	12938	13556
7	531921	559133
8	72605	75149
9	36477	38203
10	59500	61036
11	119973	148750
12	144315	155472
13	207462	231939
14	165357	180433
15	205167	220762
16	128500	133927
17	105313	112184
18	33657	36633
19	317551	338200
20	25185	28916
21	61729	63745
22	67104	67927
23	109953	123631
24	138540	146637
25	228404	258362
26	138077	139111
27	84664	92069
28	8618	9173
29	30170	31734
30	13027	13632
31	113966	124538
32	26282	30569
33	76079	85082
34	8017	7795
35	19879	22515
** 36	137351	146776
37	29623	31431
38	137642	143565
39	68408	68593
40	11212	12288
41	444601	485522
42	640430	682587

43	198317	209572
44	24378	27074
45	60318	51269
46	126751	145421
47	49719	59819
48	337994	361626
49	62290	66882
50	44292	49553
51	188946	224630
52	91160	103377
53	25023	27592
54	31683	34862
55	48787	53977
56	336149	375294
57	82111	91887
58	56204	63249
59	270204	304862
60	353002	377514
61	195564	208643
62	381959	410433
63	0	0

* Aggregated from 228 sectors to 63

** Telecommunications numbers exclude access charges as discussed in report.

Section Ib

Concept: Sectoral Output Prices

Variable: Output price indices by industry

Source: Bureau of Labor Statistics, Office of Employment Projections output time series data, November 1995.

Release Date: Every two years (October or November of odd years). Preliminary 1995 numbers will be out in December of 1996 or January of 1997. Finalized 1995 numbers will be out October or November of 1997.

Lag: 2 to 3 years.

Method: Author calculations described below.

Calculations: The value of industry output in current dollars divided by the value of industry output in real 1987 dollars for each year.

Example: The data used in the calculations below are actual data.

Year	Telecommunications Output in current dollars		Telecommunications Output in 1987 dollars		Telecommunications Output price index 1987=1
1988	172,282	/	179,001	=	.9625
1989	177,663	/	186,222	=	.9540
1990	181,772	/	190,365	=	.9549

Used to create: Sectoral material purchases.
Sectoral input price indexes.

Data follows on next pages:

Current dollar output by industry reported by the OEP BLS *
Millions of dollars

Industry	1987	1988
1	178859	190099
2	28703	31985
3	7001	9577
4	25929	25655
5	97529	90641
6	12938	13556
7	531921	559133
8	72605	75149
9	36477	38203
10	59500	61036
11	119973	148750
12	144315	155472
13	207462	231939
14	165357	180433
15	205167	220762
16	128500	133927
17	105313	112184
18	33657	36633
19	317551	338200
20	25185	28916
21	61729	63745
22	67104	67927
23	109953	123631
24	138540	146637
25	228404	258362
26	138077	139111
27	84664	92069
28	8618	9173
29	30170	31734
30	13027	13632
31	113966	124538
32	26282	30569
33	76079	85082
34	8017	7795
35	19879	22515
36	162367	172282
37	29623	31431
38	137642	143565
39	68408	68593
40	11212	12288
41	444601	485522
42	640430	682587

43	198317	209572
44	24378	27074
45	60318	51269
46	126751	145421
47	49719	59819
48	337994	361626
49	62290	66882
50	44292	49553
51	188946	224630
52	91160	103377
53	25023	27592
54	31683	34862
55	48787	53977
56	336149	375294
57	82111	91887
58	56204	63249
59	270204	304862
60	353002	377514
61	195564	208643
62	381959	410433
63	0	0

* Aggregated from 228 sectors to 63

Note: Telecommunications numbers include access charges.

1987 dollar output by industry reported by the OEP BLS *
Millions of 1987 dollars

Industry	1987	1988
1	178859	167942
2	28703	30092
3	7001	8353
4	25929	26836
5	97529	97732
6	12938	13505
7	531922	539217
8	72605	71727
9	36477	36482
10	59500	60373
11	119973	131002
12	144315	148009
13	207462	230163
14	165357	177982
15	205167	218008
16	128500	131618
17	105313	109609
18	33657	35391
19	317551	323175
20	25185	25966
21	61729	61196
22	67104	65988
23	109953	112776
24	138540	139696
25	228404	234993
26	138077	144949
27	84664	87647
28	8618	8486
29	30170	31845
30	13027	13030
31	113966	119614
32	26282	27746
33	76079	83638
34	8408	8608
35	19879	23708
36	162367	179001
37	29623	29414
38	137642	142284
39	68408	69869
40	11212	11589
41	444601	456627
42	640430	665591

43	198317	197751
44	24377	24335
45	60318	53928
46	126751	136517
47	49719	56156
48	337993	344891
49	62290	63172
50	44292	47733
51	188946	210892
52	91160	99188
53	25023	27010
54	31683	33327
55	48787	51772
56	336149	350831
57	82111	88287
58	56204	59212
59	270204	284575
60	353001	359726
61	195564	197808
62	381959	391386
63		0

* Aggregated from 228 sectors to 63.

Ouput price index by industry
Implicit price index computed from real and nominal ouput data
from Office of Employment Projections, BLS

Industry	1987	1988
1	1.0000000	1.1319369
2	1.0000000	1.0629311
3	1.0000000	1.1464607
4	1.0000000	0.9559700
5	1.0000000	0.9274421
6	1.0000000	1.0037466
7	0.9999983	1.0369346
8	1.0000000	1.0477072
9	1.0000000	1.0471681
10	1.0000000	1.0109801
11	1.0000000	1.1354846
12	1.0000000	1.0504169
13	1.0000000	1.0077140
14	1.0000000	1.0137700
15	1.0000000	1.0126302
16	1.0000000	1.0175418
17	1.0000000	1.0234861
18	1.0000000	1.0350820
19	1.0000000	1.0464917
20	1.0000000	1.1136135
21	1.0000000	1.0416501
22	1.0000000	1.0293795
23	1.0000000	1.0962521
24	1.0000000	1.0496902
25	1.0000000	1.0994459
26	1.0000000	0.9597265
27	1.0000000	1.0504500
28	1.0000000	1.0809686
29	1.0000000	0.9965112
30	1.0000000	1.0462328
31	1.0000000	1.0411624
32	1.0000000	1.1017510
33	1.0000000	1.0172662
34	0.9535896	0.9055077
35	1.0000000	0.9496673
36	1.0000000	0.9624670
37	1.0000000	1.0685951
38	1.0000000	1.0090046
39	1.0000000	0.9817301
40	1.0000000	1.0602889
41	1.0000000	1.0632784

42	1.0000000	1.0255343
43	1.0000000	1.0597804
44	1.0000287	1.1125612
45	1.0000000	0.9507044
46	1.0000000	1.0652182
47	1.0000000	1.0652179
48	1.0000021	1.0485229
49	1.0000000	1.0587256
50	1.0000000	1.0381222
51	1.0000000	1.0651395
52	1.0000000	1.0422310
53	1.0000000	1.0215287
54	1.0000000	1.0460682
55	1.0000000	1.0426027
56	1.0000000	1.0697291
57	1.0000000	1.0407783
58	1.0000000	1.0681803
59	1.0000000	1.0712901

Section IIa

Concept: Sectoral Material Purchases

Variable: 1987 Material expenditures

Source: 1987 Make and Use Matrices, *Benchmark Input-Output Accounts of the United States: 1987*, Bureau of Economic Analysis, November 1994.

Release Date: An official census-based table is published every five years in the fall. The next release is the 1992 benchmark table due out in the fall of 1997.

Lag: 5 years.

Method: Author calculations described below

Calculations: First we aggregated the Bureau of Economic Analysis (BEA) 1987 make and use matrices to 63 industry sectors. Then we performed matrix multiplication of these aggregated make and use matrices. This leaves us with a 63 x 63 sector input output matrix in coefficient form. The relevant data from this matrix is the Telecommunications column shown on the following page. Next we take the Bureau of Labor Statistics Office of Employment industry output aggregated to conform with these 63 industry sectors. Multiplying the total output for each of the industries by the coefficients from the sector's column gives us the material purchases by this sector from all other sectors.

Example: Note this is hypothetical data to show calculation not actual data.

	Current $ Output by industry			1987 A matrix
Year	1		Industry	Column only
1987	25,425	*	1	0.12
			2	0.32

Year	Calculation		1987 Material Purchases
1987	(25,425 * .12) + (25,425 * .32)	=	11,187

Note: 1987 is the last census-based table. In the past, both BEA and BLS produced non-census based (i.e. survey-based or statistically adjusted) tables between benchmark releases. Currently, BEA is no longer releasing annual tables and BLS has just released a 1993 table. However, this table has been updated from the 1977 and 1987 matrices with a programming technique. This technique takes final demand, industry and commodity output, and value added and within a routine adjusts the cells of the estimated 1993 table to constraints from row and column totals in 1993 and the 1977 and 1987 individual cell values from those tables.

Used to create: Sectoral input price indexes.

Current dollar output by industry reported by the OEP BLS *
Millions of dollars

Industry	1987	1988
1	178859	190099
2	28703	31985
3	7001	9577
4	25929	25655
5	97529	90641
6	12938	13556
7	531921	559133
8	72605	75149
9	36477	38203
10	59500	61036
11	119973	148750
12	144315	155472
13	207462	231939
14	165357	180433
15	205167	220762
16	128500	133927
17	105313	112184
18	33657	36633
19	317551	338200
20	25185	28916
21	61729	63745
22	67104	67927
23	109953	123631
24	138540	146637
25	228404	258362
26	138077	139111
27	84664	92069
28	8618	9173
29	30170	31734
30	13027	13632
31	113966	124538
32	26282	30569
33	76079	85082
34	8017	7795
35	19879	22515
36	162367	172282
37	29623	31431
38	137642	143565
39	68408	68593
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42	640430	682587

43	198317	209572
44	24378	27074
45	60318	51269
46	126751	145421
47	49719	59819
48	337994	361626
49	62290	66882
50	44292	49553
51	188946	224630
52	91160	103377
53	25023	27592
54	31683	34862
55	48787	53977
56	336149	375294
57	82111	91887
58	56204	63249
59	270204	304862
60	353002	377514
61	195564	208643
62	381959	410433
63	0	0

* Aggregated from 228 sectors to 63

Note: Telecommunications numbers include access charges.

BEA's 1987 input output coefficients for Telcommunications
Coefficients reflect purchases by telecommunications industry

Industry	Material Share of Telecommunications Output
1	0.00020167
2	0.00030181
3	0.00000037
4	0.00000237
5	0.00008532
6	0.00054471
7	0.00732840
8	0.00372695
9	0.00018656
10	0.00359801
11	0.00217465
12	0.00744095
13	0.00576873
14	0.02796597
15	0.00037426
16	0.00027483
17	0.00113552
18	0.00082395
19	0.00011003
20	0.00000222
21	0.00025379
22	0.00049756
23	0.00103369
24	0.00826601
25	0.00234732
26	0.00194067
27	0.00316863
28	0.00003715
29	0.00018697
30	0.00030021
31	0.00241586
32	0.00012436
33	0.00146057
34	0.00001595
35	0.00005632
36	0.19873614
37	0.00196512
38	0.00270098
39	0.00015943
40	0.00270068
41	0.01029547

42	0.00754431
43	0.01171523
44	0.00027872
45	0.00089586
46	0.00061003
47	0.00000007
48	0.01460871
49	0.00073640
50	0.00009438
51	0.01373780
52	0.00267625
53	0.00182502
54	0.00412026
55	0.00012514
56	0.00001525
57	0.00334089
58	0.00048618
59	0.00592795
60	0.00204263
61	0.00179318
62	0.00470904
63	0.02309660
Total	0.40109004

Note: Material purchases were computed using this data and then roughly
$25 billion in inter-industry access charges were deducted from the material purchases.

Section IIb

Concept: Sectoral Material Prices

Variable: Annual material price index

Source: 1987 Make and Use Matrices, Benchmark Input-Output Accounts of the United States: 1987, Bureau of Economic Analysis, November 1994. Bureau of Labor Statistics, Office of Employment Projections' output time series data.

Release Date: Data needed to calculate 1994 and 1995 numbers will come out in December of 1996 or January of 1997.

Lag: Two to three years.

Method: Author calculations as described below.

Calculations: Matrix multiplication of output price index for all industries and the telecommunications column of the aggregated A matrix described in section IIa.

Example: Note this is hypothetical data to show calculation not actual data.

	Output Price Index by industry	
Year	1	2
1987	1.00	1.00
1988	1.20	1.12
1989	1.30	1.12

*

	1987 A matrix
Industry	Telecommunications column only
1	0.24
2	0.05

=

		Telecommunications	Telecommunications
Year	Calculation	Material price index	Material price index 1987=1
1987	(1.00 * .24) + (1.00 * .05) =	0.2900	1.0000
1988	(1.20 * .24) + (1.12 * .05) =	0.3440	1.1862
1989	(1.30 * .24) + (1.12 * .05) =	0.3680	1.2690

Used to create: Price index of material.
Sectoral input price indexes

Data follows on next pages:

Ouput price index by industry
Implicit price index computed from real and nominal ouput data
from Office of Employment Projections, BLS

Industry	1987	1988
1	1.0000000	1.1319369
2	1.0000000	1.0629311
3	1.0000000	1.1464607
4	1.0000000	0.9559700
5	1.0000000	0.9274421
6	1.0000000	1.0037466
7	0.9999983	1.0369346
8	1.0000000	1.0477072
9	1.0000000	1.0471681
10	1.0000000	1.0109801
11	1.0000000	1.1354846
12	1.0000000	1.0504169
13	1.0000000	1.0077140
14	1.0000000	1.0137700
15	1.0000000	1.0126302
16	1.0000000	1.0175418
17	1.0000000	1.0234861
18	1.0000000	1.0350820
19	1.0000000	1.0464917
20	1.0000000	1.1136135
21	1.0000000	1.0416501
22	1.0000000	1.0293795
23	1.0000000	1.0962521
24	1.0000000	1.0496902
25	1.0000000	1.0994459
26	1.0000000	0.9597265
27	1.0000000	1.0504500
28	1.0000000	1.0809686
29	1.0000000	0.9965112
30	1.0000000	1.0462328
31	1.0000000	1.0411624
32	1.0000000	1.1017510
33	1.0000000	1.0172662
34	0.9535896	0.9055077
35	1.0000000	0.9496673
36	1.0000000	0.9624670
37	1.0000000	1.0685951
38	1.0000000	1.0090046
39	1.0000000	0.9817301
40	1.0000000	1.0602889
41	1.0000000	1.0632784

42	1.0000000	1.0255343
43	1.0000000	1.0597804
44	1.0000287	1.1125612
45	1.0000000	0.9507044
46	1.0000000	1.0652182
47	1.0000000	1.0652179
48	1.0000021	1.0485229
49	1.0000000	1.0587256
50	1.0000000	1.0381222
51	1.0000000	1.0651395
52	1.0000000	1.0422310
53	1.0000000	1.0215287
54	1.0000000	1.0460682
55	1.0000000	1.0426027
56	1.0000000	1.0697291
57	1.0000000	1.0407783
58	1.0000000	1.0681803
59	1.0000000	1.0712901